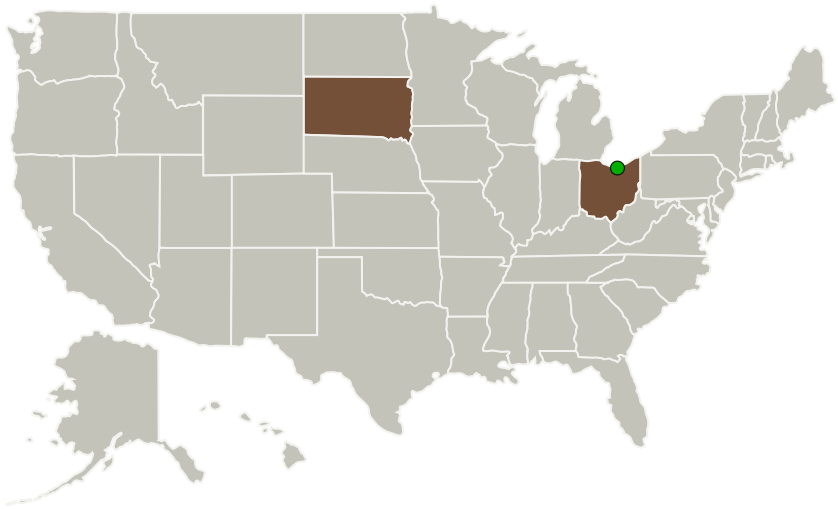
Low-Cost Multi-Junction Photovoltaic Cells, Phase I

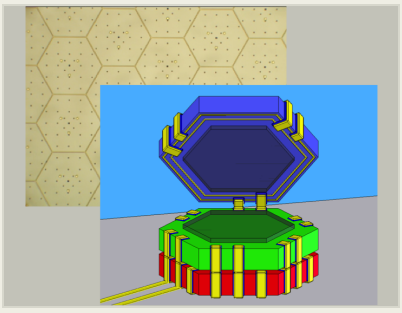
Completed Technology Project (2013 - 2013)

Project Introduction

The proposed SBIR project will provide a pathway to dramatically reduce the cost of multi-junction solar cells. The project leverages a TRL6 micropackaging process with ~100% yield for cell assembly. Cost savings are critical as space-qualified multi-junction cells render large panel applications prohibitive. The proposed project aims to develop a greatly-simplified manufacturing process that can be performed by most compound semiconductor foundries. Thus, cost savings can be derived from increased competition and scaling by leveraging low-cost high volume manufacturers for wireless components and LED lighting devices. The preliminary 3-subcell systems has >30% efficiency at 60C-100C. For higher efficiency, a 5-subcell system has >57% efficiency. For CPV applications, LCOE of the 3-subcell system at 630 suns is 20.96 cents/kWh (real)/27.20 cents/kWh (nominal).

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Black Hills Nanosystems	Lead Organization	Industry Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB), Minority-Owned Business	Rapid City, South Dakota
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	South Dakota

Project Transitions

May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138274)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Black Hills Nanosystems

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

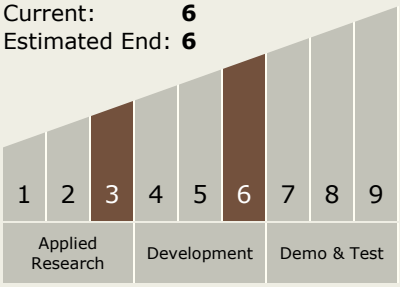
Carlos Torrez

Principal Investigator:

Gina Kim

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**



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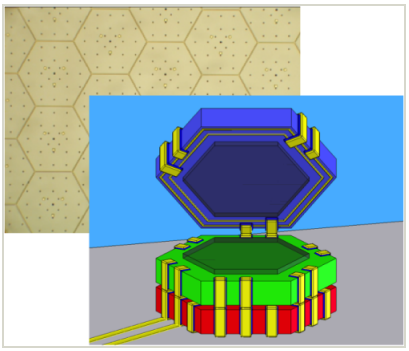
Images



Project Image
Low-Cost Multi-Junction Photovoltaic Cells
(https://techport.nasa.gov/image/131706)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.1 Power Generation and Energy Conversion
    - TX03.1.1 Photovoltaic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System